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ANALYTICAL ABSTRACTS OF CURRENT LITERATURE.

The Relation Between Baseleveling and Organic Evolution. By J. B. WOODWORTH. (American Geologist, October, 1894, Vol. XIV., No. 4, pp. 209-234.)

In the historical sketch the writer speaks of the former strong belief of the British geologists in marine action as the origin of baseleveling, due in large measure to their insular position. They have recently been awakened by the work of the continental geologists in regard to baseleveling by meteoric agents.

In America, Powell, Gilbert, Davis, McGee, and others have established a cycle of existence for rivers and their valleys, ranging from youth, in a newly elevated country, through adolescence, maturity, and so on into old age, when, the land remaining stable, a peneplain will be formed. An uplift will revive the streams and start a new cycle. Many other points of interest are brought out by these writers in regard to the history of river systems.

Under the general effect of river changes on fluvial faunas, the important relation of the topographic history to the distribution of fresh-water fish and mollusks is shown. This may be through (1) head-water division, (2) antecedent streams, (3) alluviation, (4) slight submergence, (5) elevation and revival of streams.

Effect of baseleveling of a mountainous region is discussed, including the fading away of divides, the degradation of uplands, spread of lowland conditions, the peneplain as an open field for land life, uplift and dissection of the peneplain. The Jura-Cretaceous peneplain is discussed at length, both in its topography and its influence on life. It forms a conspicuous topographic feature in eastern North America, and traces of it occur on the Pacific coast. It is well developed in New England, Middle Atlantic states, and southward. At the close of the Cretaceous the peneplain was elevated when streams began to cut valleys, and another Tertiary baselevel had almost been completed when a new uplift caused rejuvenation.

The influence of the peneplain on life is most pronounced, being most favorable for reptiles, which abound in such great numbers. Reptiles are characteristic lowland forms. They can endure the cold of high altitudes or latitudes only by falling into a torpor. The conditions being so favorable, they thrive in such vast numbers and are of such great size that the mammals are virtually driven to the uplands and almost extinguished. Several theories

are advanced for the extinction of these large reptiles. Professor Verrill regards lack of parental care as a cause; Professor Marsh thinks the small brain, highly specialized characters, and huge bulk, prevented them from adapting themselves to changing conditions. Wood attempts an explanation in the geographic changes. The flora, it is shown, changed almost as much as the fauna.

In attempting to extend his theories to periods of baseleveling antecedent to the Mesozoic, the writer finds a check in the insufficiency of knowledge concerning the early land forms. Comparison of meteoric baseleveling with glaciation and submergence shows that only the first is conducive to land life, that both glaciation and marine invasion are sterilizing in their effects.

T. C. H.

Tertiary and Early Quaternary Baseleveling in Minnesota, Manitoba, and Northwestward. By W. UPHAM. (American Geologist, Vol. XIV., No. 4, October, 1894.)

This paper forms an excellent supplement to the preceding one, taking up the history where the other leaves off. The area, character, vertical extent, etc., of the baseleveling of the northwestern plains during the Tertiary area is followed by a discussion of the renewed elevation and partial baseleveling at the close of the Tertiary. Attempt is made to correlate this period of leveling with one in Pennsylvania, New Jersey, the southern states, and in the West. The origin of the Red River valley is found in this later erosion. Topographic features of Minnesota and Manitoba, due to the cycles of baseleveling, are discussed, also the direction of the Tertiary and early Quaternary drainage. The last uplift, that at the beginning of Quaternary times, he says, raised the area 3000 to 5000 feet higher than it is now, as shown by the fjords and submarine valleys of the North Atlantic, Arctic, and North Pacific coasts. It was the culmination of this uplift that brought the great snow accumulations of the glacial period, under whose weight the land sunk below its present level, causing the ice to melt. His approximate measures of the denudation, along with some of his former estimates, give the duration for different periods as follows: Tertiary, two to four million years; the Lafayette, 60,000 to 120,000 years; Glacial period, 20,000 to 30,000 years; and the Recent period, 6,000 to 10,000 years.

T. C. H.

Proof of the Presence of Organisms in Pre-Cambrian Strata. MR. L. CAYEUX. (Bull. de la Soc. Geol. de France, Ser 3e, tom 22e, June, 1894, pp. 197-228.)

Stratigraphy.—Radiolaria occur in beds of siliceous schists (ptanite of Haüy) and quartzites of North Belgium, the position of which has been determined by Professor Charles Barrois. Their horizon is shown to be constant

in a series of schists and graywacke corresponding in point of ages with the *phyllades de Saint Lô* (pre-Cambrian).

Preservation.—The radiolaria were, as is usual with the Palæozoic forms, very badly preserved, so that a great many sections were necessary to obtain a few good specimens. Even these were so delicate and so surrounded and filled with fragments of carbonaceous material as to greatly increase the difficulty of observation. The outlines and details of structure were nevertheless, as the plates indicate, so complete in many instances as to leave no doubt as to the nature of the organisms. The skeletal silica is often found in the form of opal, often replaced by carbon.

Forms found.—Among the number of forms whose generic place could be determined beyond doubt are mentioned: *Cenosphæra*, *Carposphæra*, *Xiphosphæra*, *Stanrosphæra*, *Acanthosphæra*, *Cenellepsis*, *Spongurus*, *Tripocalpis*, *Tripilidium*, *Tripodiscium*, *Archicorys*, *Cyrtocalpis*, *Dictyocephalus*, *Sethocapsa*, *Dicolocapsa*, *Theocampe*; representing the sub-orders, *Sphæroidea*, *Cyrtosidea*, *Prunioidea* and (not determinable as to genus) *Discoidea*.

Criticisms.—The author takes up in detail objections that have been raised against the existence of radiolaria in pre-Cambrian strata as (1) the invisibility of the reticulated, skeletal structure, (2) the impossibility of seeing the siliceous tests imbedded in quartzite, (3) the uniform regularity of the figures observed and the size of the observed forms in comparison with known radiolaria, (4) the contact or intergrowth of the pre-Cambrian forms, (5) their similarity to foraminifera.

Character of the fauna.—A discussion of the grouping and comparative abundance of various species follows, and then a comparison of the pre-Cambrian fauna with the radiolaria of the Silurian and of the present. E. C. Q.

The Niobrara Chalk. By SAMUEL CALVIN, Iowa City, Iowa. (American Geologist, September, 1894.)

The presence of the Niobrara chalk has been demonstrated at various points in Iowa as far east as Auburn, in Sac county, while fossils in the drift indicate its former existence at points much farther east than this. The paper deals chiefly with the characteristics of the formation as exhibited eastward from the mouth of the river from which it takes its name. In their typical development the strata are soft, calcareous deposits lying in massive beds, and exhibit all the characteristics of chalk. The beds represent the final stage in a progressive subsidence, when the mechanical sediments gave place to those of organo-chemical origin, with waters clear and moderately deep, and the shore line probably a hundred miles to the eastward. An upward movement began before the close of the Niobrara age. The most conspicuous invertebrates are *Inoceramus problematicus* and *Ostrea congesta*. Numer-

ous citations are given showing that the general attitude of American geologists has been against the recognition of chalk in the American Cretaceous.

"The characteristics of the Niobrara chalk are such that exhaustive investigations with the microscope may be carried out with very little difficulty." Foraminifera are abundant, and in places constitute from one fourth to one third the volume of the chalk. Coccoliths are most abundant, though the small, rodlike rhabdoliths may also be detected with a high-power objective. The genera and species represented vary somewhat with the locality and the beds from which they were obtained. *Textularia globosa* is represented by a large and a small form, which grade into each other. The latter has been regarded as a distinct species, *Textularia pygmaea*, by Dawson. Differences in development are correlated with the probable conditions relative to depth and the amount of earthy sediments. The identity of the Niobrara with the English chalk is well established.

C. H. G.

A Study of the Cherts of Missouri. E. O. HOVEY. (American Journal of Science, November, 1894, p. 401.)

Thirty-eight specimens from different parts of the state were examined in fifty thin sections, about one-half from the Lower Magnesian (Ozark or Broadhead) Series, and about one-half from the Lower Carboniferous.

Petrography and fossil remains.—The cherts consist mostly of chalcedony, with quartz and opal present to some extent. Careful search failed to reveal any indication of radiolaria or sponge spicules, with the exception of certain slender, cylindrical rods in one specimen, which showed nuclei of a brown substance surrounded by clear chalcedony. Many of the fossiliferous cherts from the Lower Carboniferous showed sections of brachiopods, crinoids, and corals, and in some cases of *Stromatopora*.

Chemistry.—Analyses showed the non-fossiliferous cherts to be nearly pure silica with more or less alumina and iron. The "altered" and "unaltered" cherts are shown to be chemically very nearly identical. The very small percentage of water in the pure cherts would indicate a small amount of opal.

Origin.—The theories of Prestwich, Hull, and Hardman, Irving and Van Hise, Renard and Hinde are reviewed, and the author concludes that the cherts studied by him "are due to chemical precipitation, probably at the time of the deposition of the strata in which they occur, or before their consolidation."

E. C. Q.